

Report on Cancer Rates in Howrah suburb

Background

X Some residents of Howrah perceived that there was a high rate of cancers in their suburb, particularly in the vicinity of Wentworth Park, in an area that had previously been sand-mined then reclaimed by using it as a landfill site for domestic waste from 1962 to 1969. There were concerns that cancers amongst residents living on the border of the old tip site could be the result of contamination from the wastes dumped at the site, or other associated activities. ??

To respond to the community's concern, we have analysed the available cancer incidence data from 1978 to 2001 to assess whether a cancer cluster exists in Howrah.

Data and statistical methods

1. Data

- Cancer incidence data rather than cancer deaths data were used as they are more complete. (Not every person with a cancer dies of that cancer). The Tasmanian Cancer Registry has reliable incidence data going back to 1978, and at the time of requesting the data for this report, data up to and including 2001 were available.
- Unit record cancer incidence data for the years 1978-2001 were obtained from the Tasmanian Cancer Registry, operated and maintained by the Menzies Centre. There are a number of fields in the dataset that includes cancer site, sex, age, Howrah, Not Howrah and year of diagnosis.
- We used population data from the 1976, 1981, 1986, 1991, 1996 and 2001 censuses provided by the ABS for data analysis as only census years can give the number of persons by place of usual residence. These data are aggregated by sex, five-year age group, Howrah and the rest of Tasmania.
- The ABS uses census collector districts (CCD) to define Howrah suburb, which is an aggregate of 16 CCDs and is a smaller geographic area than Howrah postcode 7018 (see Table 1 in Appendix One). Note that previous reports have used only postcode level data, with postcode 7018 having about 18,000 people compared to approximately 7500 in the suburb. Data for the smaller area were obtained from the Cancer Registry and analysed after advice was received from the Solicitor-General that this would not cause the Director of Public Health to be exposed to breaches of confidentiality via requests from the public for the data under the Freedom of Information Act.
- The information on the median age estimated for Howrah and the rest of Tasmania was provided by the ABS for the census years from 1976 to 2001

2. Statistical methods

- Indirect standardisation was used to calculate expected number of cancer cases that would occur in Howrah based on the cancer incidence rates of the rest of Tasmania for the same period.
- The population figures from censuses were used to calculate age and sex-specific incidence rates for the rest of Tasmania, rather than Estimated Resident Populations as used by the Cancer Registry in some other documents. This is because the census counts of population (which are more precise) are different from the Estimated Resident Population published subsequent to the census, as shown in Table 2 (Appendix One). Although the ABS adjusts the population estimates after the Census based on births, deaths and persons of net estimated interstate and overseas migration, we believe the Census represents the reliable figures of population not only for Howrah, but also for the rest of Tasmania.
- The Standardised Incidence Ratio (SIR) was derived from the ratio of observed number of cases in Howrah to the number of expected cases that were calculated according to the age and sex-specific rates in the rest of Tasmania, multiplied by 100.
- The exact 95% and 99% confidence intervals were calculated for each estimated SIR by assuming a Poisson process.
- The statistical significance of a SIR was determined based on confidence intervals. If a 95% or 99% confidence interval for a SIR does not include 100, it was considered to be statistically significant at the 5% level or at the 1% level.

3. Approaches to data analysis and interpretation, and cautionary notes

The cancer incidence data were examined from a variety of perspectives, to look for any evidence of abnormal patterns in cancer type as well as frequency, or for excesses in particular age groups. Particular issues raised by a resident were also explored within the constraints of data analysis for such a small population. Demographics were also explored, given the importance of understanding age as a powerful determinant of cancer incidence.

Use of the suburb as the defined geographic area of interest (rather than postcode or Local Government Area) is regarded as the smallest area that it is statistically feasible to report on with any confidence for the range of cancer types, and sufficient statistical power has been achieved by aggregating the 24-year period 1978 – 2001.

There is always the possibility (likelihood) that in examining cancer statistics for a small population across a range of cancer types, that one or more cancers will vary significantly from the State average as a result of random (chance) variation alone. To help overcome that problem in this report, the data are analysed down to 1% significance levels as well as 5% level.

Statistically significant findings may also have a range of potential explanations other than chance variation, with a local environmental contamination cause being but one of the possibilities. Age distribution, socioeconomic factors, lifestyle factors (such as diet and smoking) and other variables including access to early diagnosis services such as breast screening and prostatic antigen detection, can all influence the rates of cancer in one area compared to another.

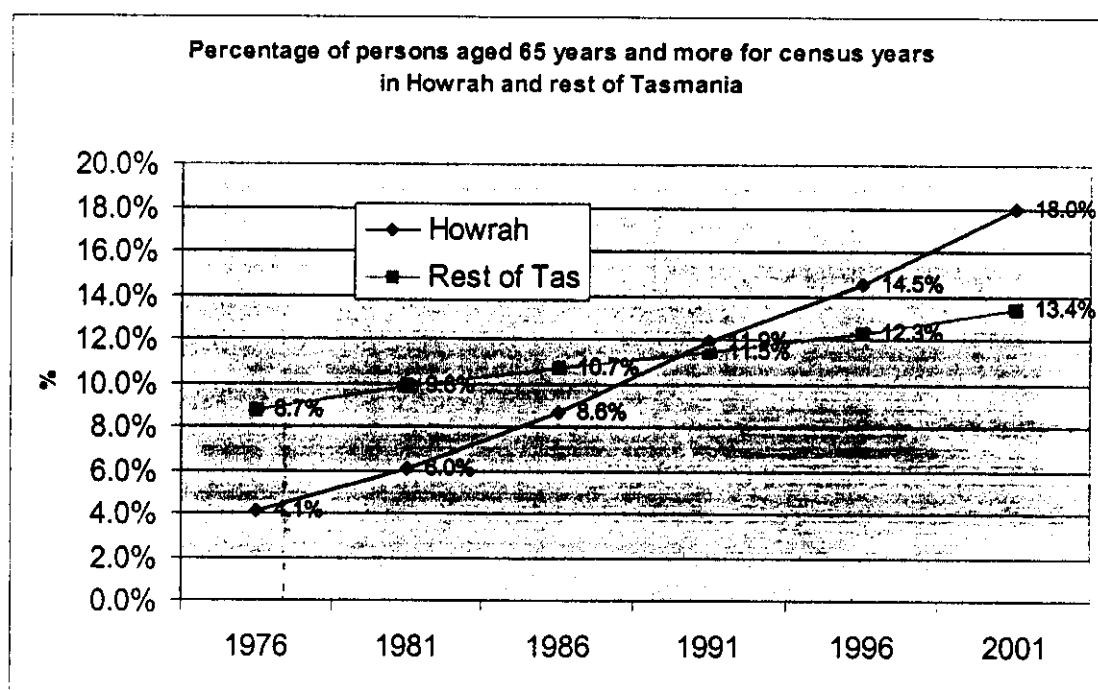
Although residences were being built in the area prior to 1978, (some moved into the area in 1965 for example) it is not regarded as problematic that incidence data prior to 1978 are not available, because of the well-recognised latency period between a causative exposure and subsequent appearance of a cancer.

Results

1. Percentage of older people in Howrah Suburb

- The percentage of persons aged 65 years and older in Howrah increased markedly from 4.1% in 1976 to 18% in 2001.
- The percentage of persons aged 65 years and older in Howrah was lower than those in the rest of Tasmania in 1976-1986.
- The percentage of persons aged 65 years and older in Howrah was higher than those in the rest of Tasmania in 1991-2001.

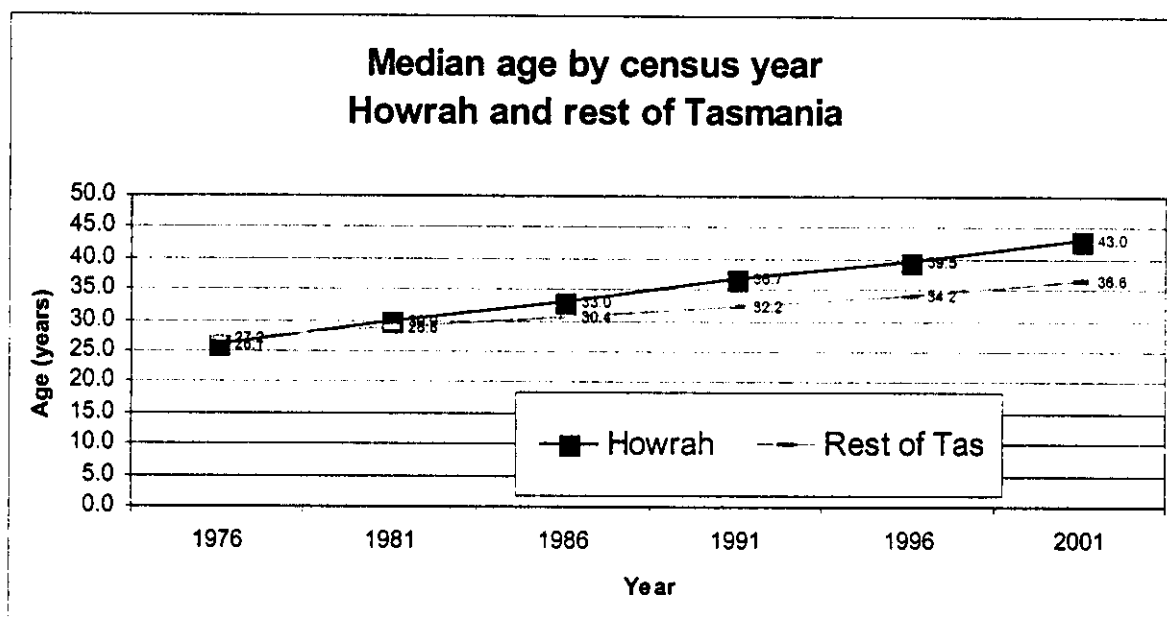
Fig. 1: Percentage of persons aged 65 years and more in Howrah and the rest of Tasmania



2. Median age

- In 1976, the residents in Howrah had a median age of 26.1 years that was slightly younger than that (27.2 years) of the population for the rest of Tasmania.
- However, the median age of Howrah population increased to 43 years in 2001, which was 6.4 years older than that (36.6 years) of the population for the rest of Tasmania.

Fig. 2: Median age in Howrah and rest of Tasmania



3. Standardised incidence ratio for all cancers combined in Howrah

- The incidence for all cancers for males in Howrah was 1.13 times higher than expected, which was statistically significantly higher than the average for the rest of Tasmania at the 5% level, but not at the 1% level.
- The incidence for all cancers in females in Howrah was 1.10 times higher than expected, but this was not statistically significantly different to the average for the rest of Tasmania at either the 5% or 1% level.
- The incidence of all cancers combined, in persons in Howrah was 1.11 times higher than expected, and this was statistically significantly higher than the average for the rest of Tasmania at both the 5% level and the 1% level .

Table 1:. Standardised incidence ratio for all cancers combined in Howrah, 1978-2001

Standardised incidence ratio for all cancers combined
in Howrah, 1978-2001

	Observed cases	Expected cases	O/E*100 SIR	L95%	H95%	L99%	H99%
Males	421	373.3	113	102.3	124.1	99.1	127.7
Females	375	340.6	110	99.2	121.8	96.0	125.6
Persons	796	718.5	111	103.2	118.8	100.9	121.3

4. Top 15 cancers in Howrah, 1978-2001

- Table 2 below shows Observed vs Expected cancer ratios (O/E)
- It was found that the incidence for breast and prostate cancers in Howrah was statistically significantly higher than the averages for the rest of Tasmania at the 5% level and the 1% level.
- There was no statistically significant difference found in the rates of all other common cancers between Howrah and the rest of Tasmania. Some were higher and some were lower, as would be expected in any small population due to random variation, but nothing of statistical significance was observed.

Table 2: Top 15 cancers in Howrah, 1978-2001

Top 15 cancers diagnosed in Howrah, 1978-2001

Cancer (ICD-9 code)	Observed	Expected	O/E*100	L95%	H95%	L99%	H99%
	cases	cases	SIR				
FEMALE BREAST 174	134	86.0	156	130.6	184.5	123.3	194.0
PROSTATE 185	101	75.6	134	108.8	162.3	101.8	171.8
COLON 153	81	69.9	116	90.2	144.0	89.3	160.3
LUNG 162	80	86.9	92	73.0	114.5	67.7	122.0
MAL. MELANOMA 172	64	53.3	120	92.5	153.3	86.2	166.8
RECTUM 154	37	37.7	98	69.1	135.3	61.6	147.9
LYMPHOMAS 200-202	30	30.6	98	66.1	140.0	58.1	154.3
BLADDER 188	26	25.9	100	65.6	147.1	56.9	163.1
UNSP SITE 199	24	30.8	78	49.9	115.9	43.0	129.0
LEUKAEMIAS 204-8	21	19.4	108	67.0	165.5	57.1	185.3
STOMACH 151	20	21.4	93	57.9	144.3	48.3	162.0
KIDNEY 189	17	18.3	93	54.1	148.7	45.1	168.3
LIP 140	16	12.6	127	72.6	206.2	60.0	234.0
PANCREAS 157	16	16.3	98	56.1	159.4	46.4	180.9
UTERUS 182	15	12.4	121	67.7	199.5	55.6	227.1

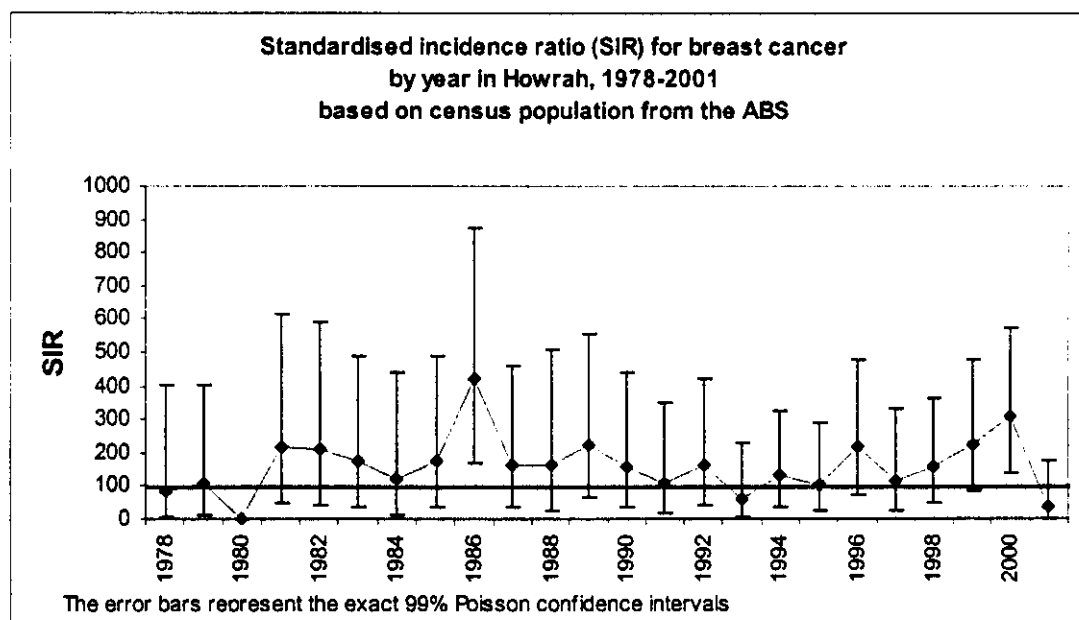
SIR = Standardised Incidence Ratio. A ratio of higher than 100 indicates that the number of observed cases is higher than expected in an average population of this age distribution. If the SIR is less than 100 then there were fewer cancers than expected. If the SIR is 156, this indicates that the rate observed was 1.56 times higher than expected. Statistical tests are then applied to help determine whether the difference is likely to be significant or a chance occurrence.

- This Table indicates that breast and prostate cancers are the main contributors to the increased incidence seen overall for Howrah compared with the rest of the state. These two cancer types are examined in greater detail in the following section

5. Trend of breast cancer in Howrah, 1978-2001

- The incidence for breast cancer in Howrah females varied by year, with the lowest in 1980 and highest in 1986.
- The incidence for breast cancer in Howrah was statistically significantly higher than the averages for the rest of Tasmania at the 1% level only for 1986 and 2000.

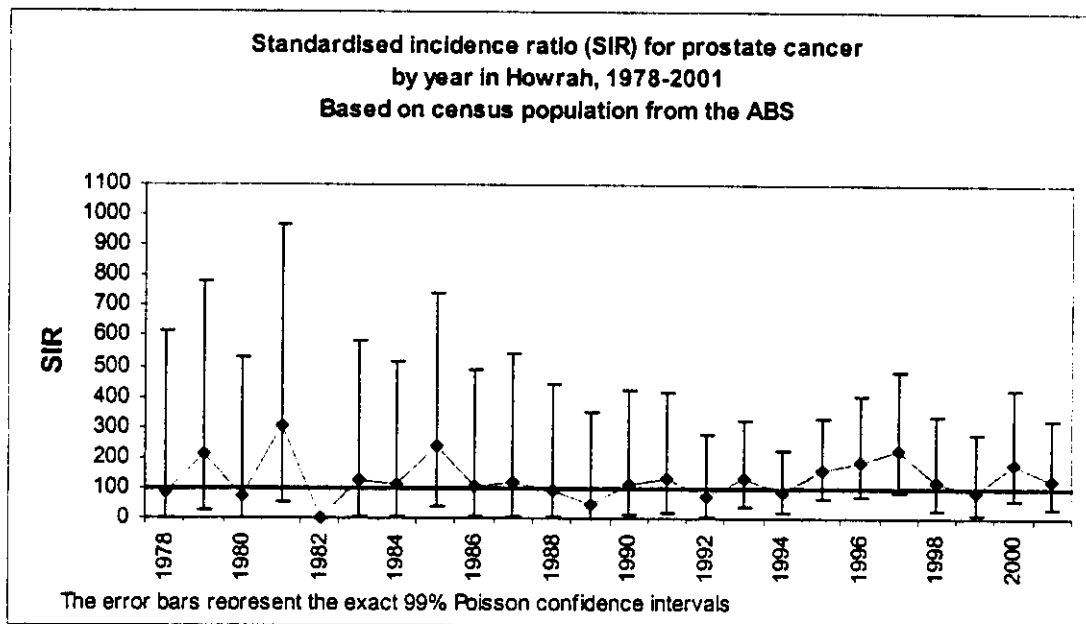
Fig. 3. Trend of breast cancer in Howrah, 1978-2001



6. Trend of prostate cancer in Howrah, 1978-2001

- The incidence for prostate cancer in Howrah males varied by year, with the highest in 1981 and lowest in 1982.
- There was no any statistical significance found in the rates of prostate cancer between Howrah and the rest of Tasmania for the period 1978 to 2001.

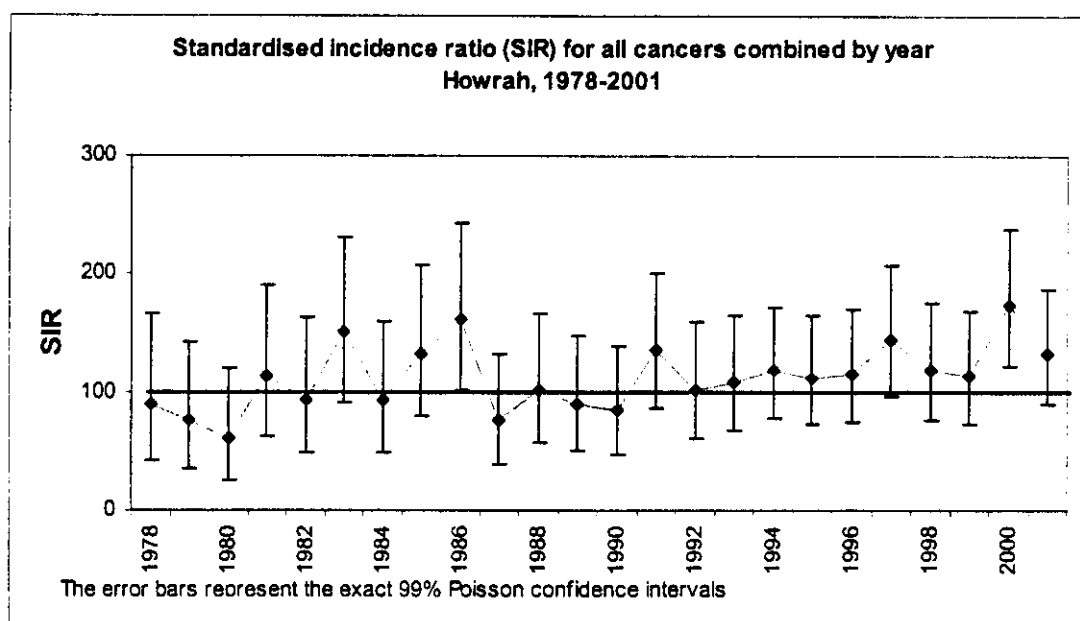
Fig. 4. Trend of prostate cancer in Howrah, 1978-2001



7. Trend of all cancers combined in Howrah, 1978-2001

- The incidence of all cancers combined in Howrah varied with time. The peak rate was recorded in 2000, whilst the lowest rate was in 1980.
- The annual incidence for all cancers combined in Howrah was statistically significantly higher than the average for the rest of Tasmania at the 1% level only for the year 2000.

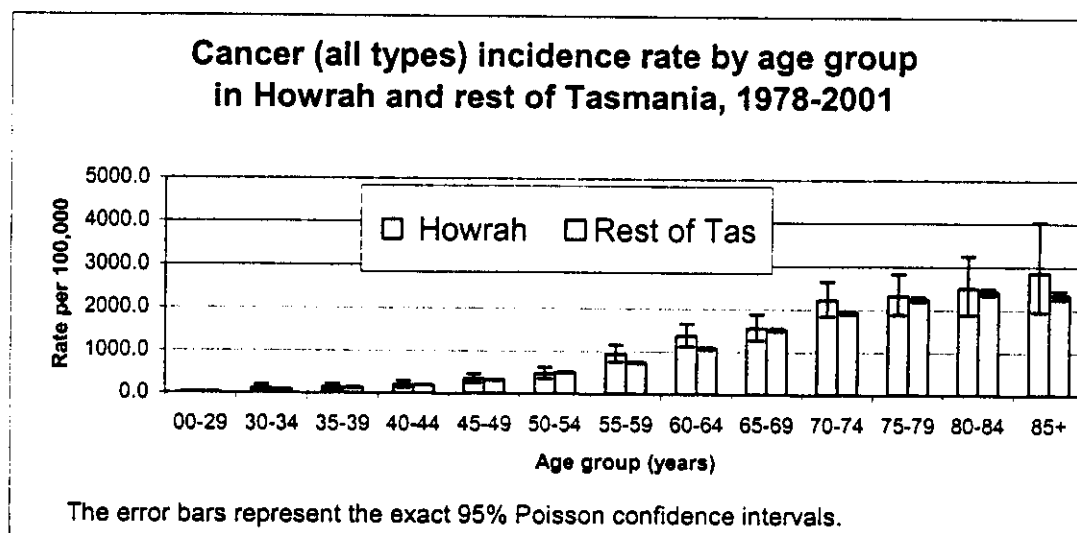
Fig. 5. Trend of all cancers combined in Howrah, 1978-2001



8. Age-specific rate of cancer (all types) in Howrah and rest of Tasmania

- Figure 6 presents the age-specific incidence rate of cancer (all types combined) and the exact 95% confidence intervals of the rate.
- The incidence rate for all cancers combined in Howrah was statistically significantly higher than the average for the rest of Tasmania at the 5% level only for persons aged 60-64 years, but not for any other age groups.

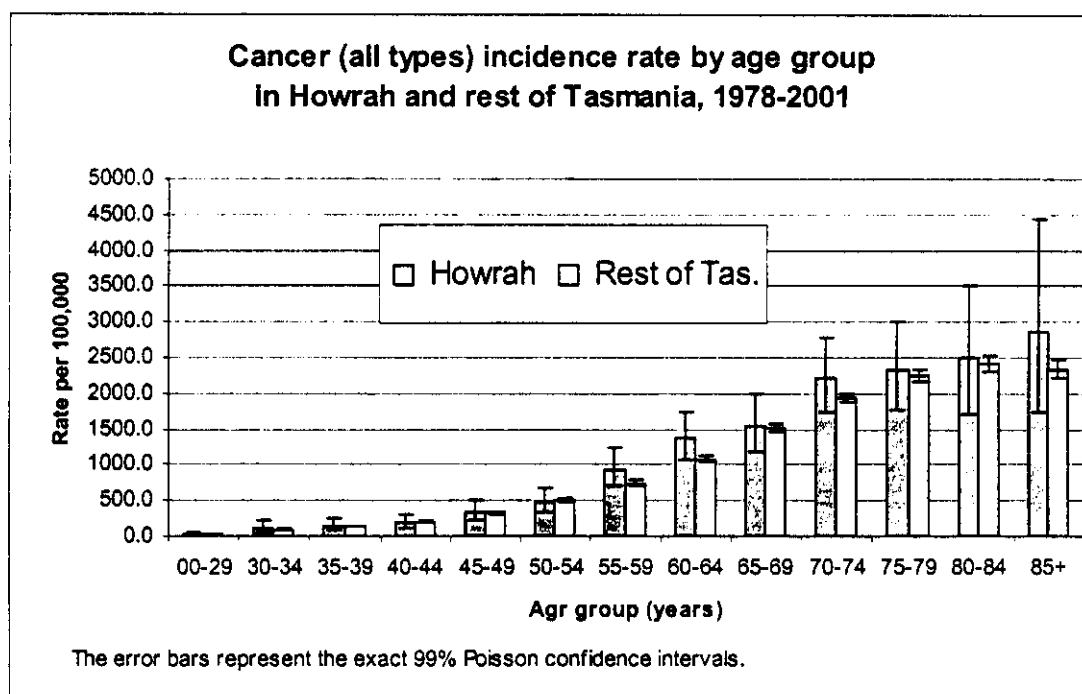
Fig. 6. Age-specific incidence rate of cancer (all types) in Howrah and rest of Tasmania



9. Age-specific rate of cancer (all types) in Howrah and rest of Tasmania

- The age-specific incidence rate of cancer (all types) and the exact 99% confidence intervals of the rate are shown in Figure 7.
- The incidence rates of all cancers combined in Howrah were similar to the averages of the rest of Tasmania, which was not statistically significant at the 1% level in all age groups.

Fig. 7. Age-specific incidence rate of cancer (all types) in Howrah and rest of Tasmania



10. A local resident proposed that there were 300 residents living in the area for period 1978-2001, and questioned what the number of expected cancers would be.

- For a population of 300 and making the assumption that age distribution is similar to the rest of Tasmania, 28 cases of cancer would be expected in the area based on the crude rate of cancer seen in the rest of Tasmania - as shown in Table 4.

Table 4: Expected cases of cancer based on 300 residents in the area

Period 1978-2001	Residents	Persons-years	Expected cases
300 residents living for 24 yrs	300	7200	28

Cancer incidence (all types) for rest of Tasmania, 1978-2001			
Incident cases	Population	Crude rate	Crude rate per 100,000
40435	10425195	0.003878585	387.9

This number well exceeds the numbers of cancer cases reported by the resident (approximately 18 cases in these streets, based on data provided by this person) and that had given rise to the resident's concern in the first place.

Conclusions

- According to the results of data analyses using the cancer incidence data in 1978-2001, it was found that the incidence of all cancers combined (Table 1) in Howrah suburb was statistically significantly higher (about 10% higher) than the rate for the rest of Tasmania.
- However, it was found that most of the increased incidence in the area was due to higher incidences of breast and prostate cancer in Howrah, which were statistically significantly higher than the rates for the rest of Tasmania (Table 2).

This finding is consistent with the data published recently by the Menzies Centre on the Internet (www.menzies.utas.edu.au/Registers/Registers.htm) regarding Cancer in Tasmania by remoteness of geographic area, for the period 1993 - 1999. This report states that:

“The incidence of all cancers combined, prostate cancer in males and breast cancer in females was found to be significantly higher in persons living in inner regional parts of Tasmania than in those living in more remote areas.”

The report also noted that higher cancer incidence rates in inner regional areas might reflect greater access to cancer screening and diagnostic services and/or differences in the distribution of risk factors for cancer.

- The implication of the age differences between Howrah and the rest of Tasmania is that observed case numbers of cancers will, on average, inevitably be higher in an older population per head of population (this is why adjustment for age is so very important in comparing two geographic areas). Figure 7 illustrates the very significant increase that occurs with age in both Howrah and Tasmania as a whole.
- Some of the excess in observed cancers in Howrah may be due to the fact that Howrah's population is aging, with a median age of 43 years in 2001 compared to 26.1 years in 1976 (Table 2).
- Evidence does not support the existence of a cancer cluster in Howrah, based on the cancer incidence data for Howrah from 1978 to 2001 and the fact that the pattern observed does not fit with PACE International Union, Health & Safety Department (2003) Cancer Cluster features, outlined below.
 1. “A large number of cases of one type of cancer, rather than several different types
 2. A rare type of cancer rather than a common type
 3. A number of a certain type of cancer in age groups not usually affected by that cancer.”

- These findings are all consistent with the observation that no plausible pathway of exposure of any significance has been identified to any contaminants in the tip subsoil, nor (as yet) have any carcinogenic contaminants been identified at the site.

The residents of Howrah will still face a serious challenge from cancer in the future as a result of the ageing of the overall population in that area, together with increasing life expectancy due to continuous reduction of other chronic diseases that typically cause premature death, such as heart disease, stroke and other diseases.

APPENDIX ONE

Table 1.

Howrah population used for data analysis

Year	Census population
1978	7479
1979	7690
1980	7690
1981	7690
1982	7690
1983	7690
1984	7756
1985	7756
1986	7756
1987	7756
1988	7756
1989	7451
1990	7451
1991	7451
1992	7451
1993	7451
1994	7292
1995	7292
1996	7292
1997	7292
1998	7292
1999	7579
2000	7579
2001	7579

Table 2.

Estimated resident population and census population in Tasmania

Year	Estimated Resident Population	Census population	Estimated Difference
1978	417642	402866	14776
1979	420756	418957	1799
1980	423590	418957	4633
1981	427224	418957	8267
1982	429845	418957	10888
1983	432805	418957	13848
1984	437760	436353	1407
1985	442828	436353	6475
1986	446473	436353	10120
1987	449226	436353	12873
1988	451148	436353	14795
1989	455258	452837	2421
1990	462188	452837	9351
1991	466802	452837	13965
1992	469826	452837	16989
1993	471659	452837	18822
1994	472939	459659	13280
1995	473673	459659	14014
1996	474443	459659	14784
1997	473478	459659	13819
1998	471700	459659	12041
1999	470803	454820	15983
2000	470376	454820	15556
2001	470272	454820	15452
Total Person-years	10882714	10606356	276358